

ELECTRICAL AUTOMATION SYSTEMS TOWARDS INTELLIGENT AND ENERGY EFFICIENCY APPLICATIONS

Musse Mohamud Ahmed



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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APPLICATIONS**

Musse Mohamud Ahmed

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978-967-418-170-3

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

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CHAPTER 25

ELECTRIC MOTOR EFFICIENCY

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This chapter presents introduction to energy efficiency motors and electric efficiency of the electrical motors.

25.1 Introduction

With projecting problems of environment protection and energy shortage, people pay more attention on energy saving. It is very important to study energy saving of induction motors as the motor is the main equipment of consuming energy in the current industries. The ever-increasing imbalance between the demand and supply of energy has focused our attention towards energy conservation in the development of electrical motors operating performance and design of operating parameters. Numerous of attempts have been made to achieve this either by harnessing energy from renewable sources or by improving the operating efficiency of devices used in generation, transmission and utilization of electric energy. Induction motors are considered to be the main workhorse and are used in very large numbers in a variety of applications which include sectors like office, home, farm and industry. Any significant improvement in the operating efficiency of induction motor will, therefore help our efforts in energy conservation. This can be achieved by taking resource to design optimization techniques. Induction motors are the main energy consuming devices in industries contributing to more than 80% of electromechanical energy conservation.

The optimal design of energy efficient induction motor is therefore the need of the day. In the past, the design of induction motor has been attempted for achieving better performance characteristics and/or reducing the cost. These were mainly trial and error based which were solely attributed by professional experiences. Digital computer has made it possible to use well-known optimization techniques in the design of electric machines. There are two technical approaches for energy saving of the motor. One is from the motor itself to improve structural design, and new material and so on. Another is from the running condition of the motor by controlling the supply voltage and frequency according to the load torque and speed.

Pump, fan and compressor drive motors, that operate a large percentage of the time necessitate highly efficient and reliable service. It has been accepted that efficiency improvements beyond those currently achieved by high efficiency induction motors will be difficult. It can be obtained only at an ever-increasing level of effort. In other words, the rate of return will decrease as further loss reductions are attempted.